

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended) A printing workflow system disposed in a network for coordinating production of a document processing job among a plurality of autonomous cells, ~~wherein each cell consists of a logical grouping of resources sufficient for completing at least one type of document processing job, and wherein each cell submits a bid to process the document processing job received by the printing workflow system,~~ the printing workflow system comprising:

a search module for searching which one or more of the autonomous cells can execute the job and creating a first subset of autonomous cells available to process the document processing job, wherein each autonomous cell consists of a logical grouping of resources, representing physical devices, sufficient for completing at least one type of document processing job;

a transfer module for transferring information to the first subset of autonomous cells about the document processing job;

a receiving module for receiving bids in response to the information transferred to the first subset of autonomous cells to process the document processing job;

a selector module for selecting one or more autonomous cells to process the document processing job based on information in the bids received; and

a queuing module for dispatching the document processing job to the selected one or more autonomous cells for processing.

2. (currently amended) The printing workflow system as recited in claim 1 wherein the printing workflow system stores all information regarding currently pending document processing jobs in each autonomous cell.

3. (previously presented) The printing workflow system as recited in claim 1 wherein the printing workflow system stores all information regarding current document processing jobs that have arrived in a print shop and have yet to be allocated for production.

4. (canceled)

5. (currently amended) The printing workflow system as recited in claim 1 wherein the selector module selects the first subset of autonomous cells with the lowest bids.

6. (currently amended) In a printing workflow system a method for processing document processing jobs by receiving bids by a plurality of autonomous cells to process the document processing job, the method comprising:

searching which one or more of the autonomous cells can execute the job and creating a first subset of autonomous cells available to process the document processing job;

transferring information to the first subset of autonomous cells about the document processing job;

receiving bids in response to the information transferred to the first subset of autonomous cells to process the document processing job; and

selecting autonomous cells to process the document processing job based on information in the bids received.

7. (currently amended) The method as recited in claim 6 wherein the printing workflow system stores all information regarding currently pending document processing jobs in each autonomous cell.

8. (previously presented) The method as recited in claim 7 wherein the printing workflow system stores all information regarding current document processing jobs that have arrived in a print shop and have yet to be allocated for production.

9. (currently amended) The method as recited in claim 8 wherein the printing workflow system stores all information regarding the currently pending document processing jobs in each autonomous cell.

10. (canceled)

11. (currently amended) The method as recited in claim 6 wherein the selector module selects the first subset of autonomous cells with the lowest bids.

12. (currently amended) A scheduling device in a printing workflow system for scheduling a document processing job among a plurality of autonomous cells ~~wherein each cell consists of a logical grouping of resources sufficient for completing at least one type of document processing job~~, the scheduling device comprising:

a first module for determining whether the document processing job can be accomplished in one autonomous cell or a plurality of autonomous cells, wherein each autonomous cell consists of a logical grouping of resources representing physical devices, sufficient for completing at least one type of document processing job;

a second module for determining the time it would take to process the document processing job in the first module;

a third module for defining timing parameters to accomplish the document processing job based on information from the second module;

a fourth module for applying the timing parameters to the autonomous cell or plurality of autonomous cells to process the document processing job by a specific due date; and

a fifth module for queuing the document processing job in one or more autonomous cells based on the information from the fourth module to efficiently process the document processing job in by the specified due date.

13. (currently amended) The scheduling device as recited in claim 12 wherein the printing workflow system stores all information regarding the currently pending document processing jobs by each autonomous cell.

14. (previously presented) The scheduling device as recited in claim 12 wherein the printing workflow system stores all information regarding current document jobs that have arrived in a print shop and have yet to be allocated for production.

15. (currently amended) The scheduling device as recited in claim 14 wherein the printing workflow system stores all information regarding the currently pending document processing jobs by each autonomous cell.

16. (currently amended) In a scheduling device in a printing workflow system, a method for scheduling a document processing job, the method comprising:

determining whether the document processing job could be accomplished in one autonomous cell or a plurality of autonomous cells, wherein each autonomous cell consists of a logical grouping of resources, representing physical devices, sufficient for completing at least one type of document processing job;

determining the time it would take to process the document processing job in the first module;

defining timing parameters to accomplish the document processing job based on the information from the second module;

applying the timing parameters to the autonomous cell or plurality of autonomous cells to process the document processing job by a specified due date; and

queuing the document processing job in one or more autonomous cells based on the information from the fourth module to efficiently process the document processing job by the specified due date.

17. (currently amended) The method as recited in claim 16 wherein the printing workflow system stores all information regarding currently pending document processing jobs in each autonomous cell.

18. (previously presented) The method as recited in claim 16 wherein the

printing workflow system stores all information regarding current document processing jobs that have arrived in a print shop and have yet to be allocated for production.

19. (currently amended) The method as recited in claim 18 wherein the printing workflow system stores all information regarding the currently pending document processing jobs in each autonomous cell.

20. (previously presented) A device for assigning a unique ID to a document processing job, the device comprising:

a matrix for defining operations performed by a printing workflow system wherein a new operation in the printing workflow system is prepended to the matrix;

a descriptor module for creating a new matrix by assigning a value in the matrix for each operation required to be performed to complete the document processing job; and

a converter module for converting the new matrix into a numerical format that represent the unique ID.

21. (canceled)

22. (canceled)

23. (canceled)

24. (original) In a device, a method for assigning a unique ID to a document processing job, the method comprising:

defining operations performed by a printing workflow system wherein a new operation in the printing workflow system is prepended to a matrix.

creating a new matrix by assigning a value in the matrix for each operation required to be performed by the document processing job; and

converting the new matrix into a numerical format that represents

the unique ID.

25. (canceled)

26. (canceled)

27. (canceled)

28. (currently amended) The device according to claim 20 further including,
a device for assigning an unique ID to a document processing job,
the device comprising:

a first module for appending to the unique ID a due date of the
document processing job;

a second module for appending to the unique ID a due time of the
document processing job;

a third module for appending to the unique ID the number of
duplicates needed for the document processing job;

a fourth module for appending to the unique ID a number of units
associated with each operation in the document processing job; and

a fifth module for creating a descriptive ID by appending the
information in the first, second, third and fourth modules into a string.

29. (canceled)

30. (canceled)

31. (previously presented) The method of claim 24 further including,
assigning a unique ID to a document processing job, the method:
appending to the unique ID a due date of the document processing
job;

appending to the unique ID a due time of the document processing

job;

appending to the unique ID the number of duplicates needed for the document processing job;

appending to the unique ID a number of units associated with each operation in the document processing job; and

creating a descriptive ID by appending the information associated with the unique ID and the due date, due time, number of duplicates and number of units with each operation into a string.

32. (canceled)

33. (canceled)

34. (canceled)

35. (canceled)

36. (canceled)

37. (canceled)

38. (currently amended) A printing workflow system disposed in a network for coordinating production of a document processing job among a plurality of autonomous cells, ~~wherein each cell consists of a logical grouping of resources sufficient for completing at least one type of document processing job~~, the printing workflow system comprising:

a search module for searching which one or more of the autonomous cells can execute the job and creating a first subset of autonomous cells available to process the document processing job, wherein each autonomous cell consists of a logical grouping of resources, of representing physical devices, sufficient for completing at least one type of document processing job;

a scheduling device for splitting document processing jobs that cannot be entirely processed in a single autonomous cell into sub-jobs capable of being entirely processed in a single autonomous cell;

a transfer module for transferring information to the first subset of autonomous cells about the document processing job;

a receiving module for receiving bids from the first subset of autonomous cells in response to the information transferred to the first subset of autonomous cells to process the document processing job;

a selector module for selecting one or more autonomous cells to process the document processing job based on information in the bids received; and

a queuing module for dispatching the document processing job to the selected one or more autonomous cells for processing.

39. (previously presented) The printing workflow system as recited in claim 38 wherein the scheduling device assigns the sub-jobs as independent document processing jobs.

40. (new) The system of claim 1, wherein the autonomous cells include at least a sub-group consisting of a printer, a binder, a copier and, a collator as the physical devices.

41. (new) The system of claim 1, wherein a bidding process comprises:
determining process routings needed to complete the job,
determining required processing time for completing the job for each of said routings, using optimal batch sizes,
comparing priority of the job with other jobs in a cell queue of at least one autonomous cell,
determining estimated release time for production of the job,
defining a cost function monotonically decreasing with a slack time when it is determined the job can be fully completed in the current autonomous cell by its due date,

generating a bid based on the defined cost function,
informing a system server of a maximum job fraction achievable for the cell when it is determined the job cannot be fully completed in the current autonomous cell, by its due date; and
providing the system server with a cost function that monotonically increases with the job fraction which can be completed.

42. (new) The system of claim 6, wherein the autonomous cells include at least a sub-group consisting of a printer, a binder, a copier and, a collator, as the physical devices.

43. (new) The system of claim 6, wherein a bidding process comprises:
determining process routings needed to complete the job,
determining required processing time for completing the job for each of said routings, using optimal batch sizes,
comparing priority of the job with other jobs in a cell queue of at least one autonomous cell,
determining estimated release time for production of the job,
defining a cost function monotonically decreasing with a slack time when it is determined the job can be fully completed in the current autonomous cell by its due date,
generating a bid based on the defined cost function,
informing a system server of a maximum job fraction achievable for the autonomous cell when it is determined the job cannot be fully completed in the current autonomous cell, by its due date; and
providing the system server with a cost function that monotonically increases with the job fraction which can be completed.

44. (new) The device of claim 12, wherein the autonomous cells include at least a sub-group consisting of a printer, a binder, a copier and, a collator, as the physical devices.

45. (new) The device of claim 12, further including a bid generated by at least one autonomous cell, the bidding process including:
- determining process routings needed to complete the job,
 - determining required processing time for completing the job for each of said routings, using optimal batch sizes,
 - comparing priority of the job with other jobs in a cell queue of at least one autonomous cell,
 - determining estimated release time for production of the job,
 - defining a cost function monotonically decreasing with a slack time when it is determined the job can be fully completed in the current autonomous cell by its due date,
 - generating a bid based on the defined cost function,
 - informing a system server of a maximum job fraction achievable for the autonomous cell when it is determined the job cannot be fully completed in the current autonomous cell, by its due date; and
 - providing the system server with a cost function that monotonically increases with the job fraction which can be completed.
46. (new) The method of claim 16, wherein the autonomous cells include at least a sub-group consisting of a printer, a binder, a copier and, a collator, as the physical devices.
47. (new) The method of claim 16, further including a bidding process comprising:
- determining process routings needed to complete the job,
 - determining required processing time for completing the job for each of said routings, using optimal batch sizes,
 - comparing priority of the job with other jobs in a cell queue of at least one autonomous cell,
 - determining estimated release time for production of the job,

defining a cost function monotonically decreasing with a slack time when it is determined the job can be fully completed in the current autonomous cell by its due date,

generating a bid based on the defined cost function,

informing a system server of a maximum job fraction achievable for the autonomous cell when it is determined the job cannot be fully completed in the current autonomous cell, by its due date; and

providing the system server with a cost function that monotonically increases with the job fraction which can be completed.

48. (new) The system of claim 38, wherein the autonomous cells include at least a sub-group consisting of a printer, a binder, a copier and, a collator, as the physical devices.

49. (new) The system of claim 38, further including a bidding system which includes:

determining process routings needed to complete the job,

determining required processing time for completing the job for each of said routings, using optimal batch sizes,

comparing priority of the job with other jobs in the cell queue,

determining estimated release time for production of the job,

defining a cost function monotonically decreasing with a slack time when it is determined the job can be fully completed in the current autonomous cell by its due date,

generating a bid based on the defined cost function,

informing a system server of a maximum job fraction achievable for the autonomous cell when it is determined the job cannot be fully completed in the current autonomous cell, by its due date; and

providing the system server with a cost function that monotonically increases with the job fraction which can be completed.